CLAIMS

1. A method for analyzing one-way delay in a packet switched network, comprising:

varying a Time To Live (TTL) value in a trace packet to intentionally cause an intermediate node in the packet switched network to send back a packet expiration notice; and

receiving an intermediate node time value in the packet expiration notice indicating when the intermediate node received the trace packet.

2. The method according to claim 1 including sending a source time value in the trace packet indicating when the trace packet was sent and receiving both the source time value and the intermediate node time value in the packet expiration notice.

3. The method according to claim 1 including:

setting a first TTL value in a first trace packet causing a first intermediate node to send back a first packet expiration notice with a first time value associated with a one-way packet delay to the first intermediate node; and

setting a second larger TTL value in a second trace packet causing a second intermediate node to send back a second expiration notice with a second time value associated with a one-way packet delay to the second intermediate node.

4. The method according to claim 3 including setting incrementally increasing TTL values in additional trace packets until a destination endpoint sends back a packet expiration notice with a time value associated with a one-way packet delay from the source endpoint to the destination endpoint.

5. The method according to claim 1 including:

using a Network Time Protocol (NTP) timestamp value for the intermediate node time value;

inserting the NTP timestamp value into an Internet Control Message Protocol (ICMP) reply message; and

using the ICMP reply message as the packet expiration notice.

6. The method according to claim 5 including using bits in an existing field of the ICMP reply message for containing the NTP timestamp value.

7. The method according to claim 1 including formatting the trace packet as a Real Time Protocol (RTP) payload packet that travels along a same media path as corresponding RTP payload packets containing media content.

8. The method according to claim 7 including varying the TTL value and setting a marker bit in the trace packet causing a destination endpoint for the trace packet to send a corresponding Real Time Control Protocol (RTCP) report.

9. The method according to claim 8 including determining whether or not to transmit a media stream according to contents of the RTCP report.

10. A network processing device, comprising:

a processor sending a packet that intentionally causes an intermediary node to send back a message containing an intermediate node timestamp value identifying when the packet reached the intermediate node.

11. The network processing device according to claim 10 wherein the processor causes the intermediate node to decrement a Time To Live (TTL) value in the packet and send back the message when the TTL value is decremented to zero.

12. The network processing device according to claim 11 wherein the processor modifies the TTL values in multiple packets causing multiple different intermediate nodes in a network to send back messages each containing intermediate node timestamp values when the TTL values in the packets are decremented to zero by that intermediate node.

13. The network processing device according to claim 10 wherein the processor discerns when the packet was sent and compares that time with the intermediate node timestamp value returned in the message to determine the one-way packet delay between the processor and the intermediate node.

14. The network processing device according to claim 10 wherein the processor formats the packet as a Real Time Protocol (RTP) payload packet that travels along a same media path as associated RTP payload packets containing an actual media payload.

15. The network processing device according to claim 14 wherein the processor sets a Time To Live (TTL) value and a marker bit in the probe packet that causes a destination endpoint for the packet to send back a Real Time Control Protocol (RTCP) report.

16. A network processing device, comprising:

a processor configured to receive a trace packet containing an expiration value causing the processor to discard the trace packet and generate an expiration message that identifies a time value associated with when the trace packet was received by the processor.

17. The network processing device according to claim 16 wherein the network processing device is located at an intermediate location in a network between a source endpoint sending the trace packet and a destination endpoint for the trace packet.

18. The network processing device according to claim 17 wherein the processor is configured to decrement the expiration value and forward the trace packet toward the destination endpoint when the decremented expiration value is not zero, the processor further configured to discard the trace packet and send the expiration message back to the source endpoint when the expiration value is decremented to zero.

19. The network processing device according to claim 16 wherein the processor uses an Internet Control Message Protocol (ICMP) reply message as the expiration message and uses a Network Time Protocol (NTP) timestamp value as the time value.

20. The network processing device according to claim 16 wherein the trace packet is formatted as a media payload packet that uses a same media path as associated media packets containing a media payload.

21. A system for analyzing one-way delay in a packet switched network, comprising:

means for varying a Time To Live (TTL) value in a trace packet to intentionally cause an intermediate node in the packet switched network to send back a packet expiration notice; and

means for receiving an intermediate node time value in the packet expiration notice indicating when the intermediate node received the trace packet.

22. A system according to claim 21 including means for sending a source time value in the trace packet indicating when the trace packet was sent and receiving both the source time value and the intermediate node time value in the packet expiration notice.

23. A system according to claim 21 including:

means for setting a first TTL value in a first trace packet causing a first intermediate node to send back a first packet expiration notice with a first time value associated with a one-way packet delay to the first intermediate node; and

means for setting a second larger TTL value in a second trace packet causing a second intermediate node to send back a second expiration notice with a second time value associated with a one-way packet delay to the second intermediate node.

24. A system according to claim 23 including means for setting incrementally increasing TTL values in additional trace packets until a destination endpoint sends back a packet expiration notice with a time value associated with a one-way packet delay from the source endpoint to the destination endpoint.

25. A system according to claim 21 including:

means for using a Network Time Protocol (NTP) timestamp value for the intermediate node time value;

means for inserting the NTP timestamp value into an Internet Control Message Protocol (ICMP) reply message; and

means for using the ICMP reply message as the packet expiration notice.

26. A system according to claim 25 including means for using bits in an existing field of the ICMP reply message for containing the NTP timestamp value.

27. A system according to claim 21 including means for formatting the trace packet as a Real Time Protocol (RTP) payload packet that travels along a same media path as corresponding RTP payload packets containing media content.

28. A system according to claim 27 including means for varying the TTL value and setting a marker bit in the trace packet causing a destination endpoint for the trace packet to send a corresponding Real Time Control Protocol (RTCP) report.

29. A system according to claim 28 including means for determining whether or not to transmit a media stream according to contents of the RTCP report.

30. A computer readable medium for analyzing one-way delay in a packet switched network, comprising:

varying a Time To Live (TTL) value in a trace packet to intentionally cause an intermediate node in the packet switched network to send back a packet expiration notice; and

receiving an intermediate node time value in the packet expiration notice indicating when the intermediate node received the trace packet.

31. A computer readable medium according to claim 30 including sending a source time value in the trace packet indicating when the trace packet was sent and receiving both the source time value and the intermediate node time value in the packet expiration notice.

32. A computer readable medium according to claim 30 including:

setting a first TTL value in a first trace packet causing a first intermediate node to send back a first packet expiration notice with a first time value associated with a one-way packet delay to the first intermediate node; and

setting a second larger TTL value in a second trace packet causing a second intermediate node to send back a second expiration notice with a second time value associated with a one-way packet delay to the second intermediate node.

33. A computer readable medium according to claim 32 including setting incrementally increasing TTL values in additional trace packets until a destination endpoint sends back a packet expiration notice with a time value associated with a one-way packet delay from the source endpoint to the destination endpoint.

34. A computer readable medium according to claim 30 including:

using a Network Time Protocol (NTP) timestamp value for the intermediate node time value;

inserting the NTP timestamp value into an Internet Control Message Protocol (ICMP) reply message; and

using the ICMP reply message as the packet expiration notice.

35. A computer readable medium according to claim 34 including using bits in an existing field of the ICMP reply message for containing the NTP timestamp value.

36. A computer readable medium according to claim 30 including formatting the trace packet as a Real Time Protocol (RTP) payload packet that travels along a same media path as corresponding RTP payload packets containing media content.

37. A computer readable medium according to claim 36 including varying the TTL value and setting a marker bit in the trace packet causing a destination endpoint for the trace packet to send a corresponding Real Time Control Protocol (RTCP) report.

38. A computer readable medium according to claim 37 including determining whether or not to transmit a media stream according to contents of the RTCP report.